APPENDIX B

MEETING MINUTES,
DEVILS LAKE PHASE 2 PROJECT
MEETINGS

Meeting Minutes: Devils Lake Upper Basin Storage Phase 2 Study Kickoff Meeting, St. Paul District U.S. Army Corps of Engineers Office, 8:00 December 5, 2000, St. Paul, Minnesota.

Present: Pat Foley (CoE), Bob Engelstad (CoE), Dave Loss (CoE), Bob Anfang (CoE), Jeff McGraft (CoE), Mike Knoft (CoE), Dan Reinhartz (CoE), Dennis Holme (CoE), Jim Sentz (CoE), David Williams (WEST Consultants), Ray Walton (WEST Consultants), Brian Doeing WEST Consultants), Selena Forman (WEST Consultants), Rick Voigt (Polaris Group), Jim Arndt (Peterson Environmental Consultants, Inc).

Discussion:

Following introductions, Dave Loss, the CoE project manager for the Devils Lake project, provided background information and the general focus for this project. Dave indicated that the schedule was very tight but that some potential for sliding the completion date a couple of weeks was possible. David Williams, president of WEST Consultants Inc, acknowledged that he was aware of the tight time frame and did not want to build the additional potential time into the schedule but rather use it as a buffer if data doesn't come in as quickly as desired. David also explained that because of the North Dakota water users conference all members of the team except for himself had met with the North Dakota State Water Commission (NDSWC) and the USGS in Bismarck the previous day. He outlined the meeting schedule for the team the remainder of the week.

The study and the EIS are to proceed concurrently.

The levees can be raised at least another 3 ft (to 1470 ft)

Potential options

- Base Case – no action except raise levees
- Upper Basin Management
- Expanded Infrastructure measures
- Outlet

Three conditions were discussed as scenarios to be modeled:

- Lake will continue to rise to 1459 and then naturally spill into the Sheyenne
- Lake will rise to 1455
- Lake will rise to 1450

Jim Arndt suggested asking the USFWS if the hydric soil survey was based upon soil survey information or wetland maps. Mr. Arndt also indicated that semi-permanent wetlands are the

least productive while upland wetlands, which typically consist of Tonka soils, are often the most productive soils during drought conditions. Tonka wetlands fill to a depth of 1 – 2 ft in spring but are dry by June

Brian Doeing relayed the suggestion by the USGS at the previous days meeting the project team had with them and the NDSWC that their existing model of Devils Lake (5 – box) be used to simulate the water balance and routing for Devils Lake. A lengthy discussion of the potential advantages and disadvantages was held between Brian, Dan Reinhartz, and Ray Walton. It was agreed the potential for using the 5 – box model should be explored further and that, subject to verification that the model is capable of meeting all the needs of the project, the USGS model may be used instead of HEC – 5 as proposed. Primary advantage was that water balance parameters have been calibrated and the model is capable of producing water quality impacts necessary in later phases of analysis. The 5 – box model has been reviewed and approved for use by CoE.

Questions to be answered on 5-box model:

- How is balance done?
- How is ungaged added?
- How is 22,000 ac-ft of storage added?
- Is model monthly in time step?
- How complex is the Code?
- Can the model start in 1980?
- How we turn pumps on at a future time?

It was suggested that the team check with the USGS regarding what level and type of wetland delineation they have for the basin.

Jim Arndt suggested possible sources of information being John Enz – NDSU Climatologist, and also Jim Richardson and Tom Winter.

Dave Loss stated that the CoE is/will be getting weather scenario input from the USGS except for 93 – 97/99 scenario. The CoE will provide two more sequences Dan Reinhardt will handle for CoE, Skip Vecchia and Greg Wiche would be the people involved with the USGS. Dan indicated that the "10,000 traces" are both cross and serially correlated, i.e. that high precipitation and low evaporation or vice-versa is most likely to occur.

Following the morning meeting two smaller meetings continued on specific topics.

Dan Reinhartz, Bob Engelstad, Jim Sentz, Dennis Holme, Brian Doeing and Rick Voigt discussed the development of potential scenario's that should be modeled. The first one to be

modeled will be 1993-1999. The dramatic effect that pre-existing conditions may have was discussed but no conclusions were reached.

Bob Anfang, Jim Arndt, Ray Walton, Selena Forman, and David Williams discussed Jim historic experience with soils, soil salinity and wetland / groundwater interaction in other area's of the Dakota's.

The bigger group reconviened @ 2:30 to wrap up discussions.

Meeting Minutes: Devils Lake Upper Basin Storage Phase 2 Study First Review Meeting, St. Paul District U.S. Army Corps of Engineers Office, 8:00 January 17, 2001, St. Paul, Minnesota.

Present: Pat Foley (CoE), Bob Engelstad (CoE), Bob Anfang (CoE), Jeff McGrath (CoE), Mike Knoff (CoE), Dan Reinartz (CoE), David Williams (WEST Consultants), Brian Doeing WEST Consultants), Selena Forman (WEST Consultants), Rick Voigt (Polaris Group), Jim Arndt (Peterson Environmental Consultants, Inc), Skip Vecchia (USGS), James Landenberger (NDSWC), Al Sapa (USFWS), Bill Pearson (USFWS).

Discussion:

Bob Engelstad began by describing that the meeting was a critical time for the various agencies to provide input. Due to the tight time frame of the project, the second project review meeting will be within approximately one month of the completion of the project. Comments received at the second review meeting or after will no longer redirect the study.

David Williams followed by introducing a PowerPoint presentation presented primarily by Selena Forman with a wrap-up and future work section presented by Brian Doeing. The presentation explained the project tasks to date with an emphasis on the level of detail undertaken using GIS to classify the over 120,000 depressional areas in the entire Devils Lake Upper Basin Watershed. Selena discussed how the GIS uses the DEM's to determine the overflow elevation for each depression, the direction of flow from the basin and an overall drainage network. The PowerPoint presentation can be found under the outgoing\Devils Lake directory on WEST Consultants FTP site, located at ftp://ftp.westconsultants.com.

Depressional storage classification was performed as follows:

- The DEM's were used to identify all depressions in the entire upper basin.
- Each of these depressions was reviewed to determine whether it was intact, drained, or other, or a lake, by pulling the USBR's air photos into the GIS background. (Categories 1, 2, 3, and 6)
- The air photos and the NWI mapping were also used to evaluate the completeness of the DEM assessment and to add additional existing drained and undrained depressions. (Category 4 and 5 depressions).
- An independent review of each classification was conducted to verify the appropriateness of the selection.

It was stressed that the full available depressional volume would be used for the hydrological modeling. The volumes of the depressions not captured by the DEM's were calculated using an area – average depth relationship from other depressions.

Dan Reinartz (with Skip Vecchia's added input) followed with how the results of this study would tie into the economic evaluation of the other alternatives. A stochastic model is needed to get probability-weighted damages. One scenario that should be modeled is a continued repeat of the 1993 through 1999 period for approximately 28 years. Dan indicated that they had to select a number of appropriate traces to simulate the downstream HEC-5Q model because the model couldn't handle 10,000 traces. Therefore, they put together a plan to also look at a trace for which the lake reaches elevations 1455 and 1450.

Jeff McGraff suggested that it might be possible to run a handful of realistic scenarios to analyze future conditions and take average BC ratios for the upper basin storage economic evaluation.

Skip Vecchia stated that he uses the years 1980 –1999 and shuffles the years to obtain future scenarios. He was concerned about using 1993. The year 1993 was very much an outlier in that it had an extremely wet summer (a 1 in 200-yr event) and this would lead to an uncharacteristic late summer spike every 7 years.

David Williams stated that the WEST/Polaris Group team could provide Skip with the results from running 1980 – 1999 through the HMS model and see what effect it has. Similarly, the years 1980 – 1999 could be shuffled and ran, reshuffled and ran, over and over.

(Note: the discussion of what alternatives to run continued in the afternoon and a summary of the final discussion is appended as an attachment.)

Bob Anfang stated that the effects on soil salinity would be evaluated for both the upper basin storage and the outlet alternatives. Jim Arndt added that he was excited by the ability to connect soil model to the runoff model using GIS. Skip asked if the soil salinity analysis will provide surface water quality results, Jim indicated that to do so would be complicated and is not likely.

Jeff McGraff indicated that Upper Basin Storage is a little different from the other options under review and would need to be feasible on its own. Lake level reduction could be used as a measure; the CoE has elevation-damage curves for the Lake.

Skip indicated that about 60% of the water in his model enters though west side while 40- 45% enters through Channel A.

All parties entered into a lengthy discussion regarding the effect of Upper Basin Storage if an extended period of drier weather were to occur. Upper Basin Storage may not have an effect because 1) runoff may not occur anyway, and 2) if the storage is accomplished through some series of 5 – 20 year easements the lake will not likely reach critical levels within that time frame, as the rate of fall is too slow. James Landenberger stated that it is his experience that short-term easements are more acceptable to the landowners. Allyn Sapa indicated that while long-term easements cost more they were not totally unacceptable, just a matter of cost. Al also stated that the USFWS easements have a history of being farmed during dry periods and have no restrictions against doing so. He also indicated that the water level would need to fall below about 1420 for major fishery's problems to begin, first through failed reproduction and then though fish survival problems.

Following lunch, the group discussed what soils were best suited to restore depressions on. Jim Arndt indicated that Tonka's and Parnell's, which don't have salinity problems, would be best suited to replace. Selena Forman showed a 4 quadrant graph the team developed that shows normalized pond area vs. normalized pond depth. No major trends were noted.

James Landenberger mentioned that the typical cost for the ESAP program easements was about $40/yr-acre. James and Al Sapa suggested that restoring wetlands deeper than 12-15-18 inches average depth would be a good starting point for one scenario. Other options discussed in addition to the 100 % restoration used to assess the theoretical maximum benefit included; all hydric soils, all hydric non-saline soils and all depressions greater than 1.5 ft containing hydric non-saline soils. Another suggestion was that is was practical to select ponds greater than 5 acres as an initial cut.

The precipitation scenario discussion resumed, Rick Voigt re-stated the sensitivity of runoff to snow pack water equivalent and that many of the gaging stations don't record precipitation during November through March. Approximately 80% of the overall runoff volume passing the discharge gages in the basin since the 1950's has been during the spring melt period. In addition, while the basin receives just less than 20 inches of precipitation on an annual basis, only about 1 inch of runoff occurs.

A January 31, 2001, draft detailed summary of the final understanding of which scenarios should be run is attached.

Teleconference Minutes: Stochastic modeling approach discussion, 10:00 January 30, 2000.

Present: Pat Foley (CoE), Bob Engelstad (CoE), Bob Anfang (CoE), Jeff McGrath (CoE), Dan Reinartz (CoE), David Williams (WEST Consultants), Brian Doeing WEST Consultants), Selena Forman (WEST Consultants), Rick Voigt (Polaris Group), Skip Vecchia (USGS), Gregg Wiche (USGS).

Discussion:

Skip Vecchia began by stating his concern about non-stationarity during initial filling of depressions. WEST will use a series of ten synthetic data sets developed by Skip. Each set will consist of a 20-year sequence of the precipitation and evaporation records for water years 1980 – 1999 selected randomly on a water-year-by-water-year basis. The use of 10 sequences is believed to be sufficient to develop reasonable estimates of the mean inflow distribution to Devils Lake and the variability of inflow. The sequences would be used to evaluate the no-restoration scenario and then used to evaluate the restoration alternatives. The CoE economists are okay with this concept.

The sequencing of restoration alternatives was discussed. Initial model results indicate that spreading out the acquisition over two years showed little effect on the overall results. It was agreed that the modeling would begin with water year 2001 and that all depressions planned for restoration within a given scenario would be restored two years later, at the beginning of water year 2003. The procedure would be to restore 100 percent of the total available depressional storage and reduce the level in increments of 25 percent.

The wet scenario approach would involve the repeating of water years 1993-1999 four cycles, or several years after Devils Lake has reached 1459. By starting with 1993, the upper basin storage modeling would be consistent with the outlet “limits study”, and any additional storage would effectively be added in water year 1995.

WEST’s initial calibration results are within about +/- 10 percent but Brian Doeing cautioned that they have no formal results and that the model is not yet calibrated. WEST will develop a technical write-up of model calibration for Mauvais Coulee at Cando so that others can review the procedure prior to the second review meeting tentatively set for Wednesday Feb 21,2001.

Meeting Minutes: Devils Lake Upper Basin Storage Phase 2 Study Second Review Meeting, St. Paul District U.S. Army Corps of Engineers Office, 8:00 February 21, 2001, St. Paul, Minnesota.

Present: Pat Foley (CoE), Bob Engelstad (CoE), Bob Anfang (CoE), Dave Loss (CoE), Mike Knoff (CoE), Dan Reinartz (CoE), Dennis Holme (CoE), Brian Doeing (WEST Consultants), Selena Forman (WEST Consultants), Rick Voigt (Polaris Group), Skip Vecchia (USGS), Bruce Engelhardt (NDSWC), Bill Pearson (USFWS), Rick Bowering (Manitoba Conservation Department), Don Buckhout (MN DNR)

Discussion:

Following introductions, Bob Engelstad began by outlining the scope and agenda for the meeting. Brian Doeing followed with an intro of the presentation by WEST and Selena Forman presented a PowerPoint presentation summarizing the work to date. The PowerPoint presentation can be found under the outgoing\Devils Lake directory on WEST Consultants FTP site, located at ftp://ftp.westconsultants.com. Preliminary summaries from the GIS data indicate the following.

Total number of intact depressions 49,290, total acreage 190,197 acres, and total volume 463,264 acre-ft.

Total number of impacted depressions 66,710, total acreage 101,365 acres, and total volume 149,625 acre-ft.

Bruce Engelhardt asked how the area-depth relationship was created. And why the number of drained depressions didn't match the NDSWC's estimate of 23,000 closer. Primary reasons may be method of counting, and inclusion of those naturally drained in the total.

Bruce felt that the number naturally draining wetland could be significant. Rick Bowering said this was not consistent with his experience north of the border in Manitoba.

Bruce also questioned the actual accuracy of the DEM's since they were based upon USGS quad sheets.

Following a question by Bill Pearson, Selena explained the limitations of the model in more detail. Bill stated that he generally agreed with the findings of the study to date.

A lengthy discussion was undertaken summarizing the model review meeting the previous day. A "two-box" alternative was discussed to model the depressional areas separate from the

rest of the soil surface. Rick Bowering suggested that a "three-box" model be used to better capture the physical processes of water transmission through the basin. He also stated that the actual numbers were not as critical as the relative importance of the various factors.

A discussion about when to change from "winter" to "summer" infiltration patterns was held, the general feeling was that the presently modeled transition is often too late in the spring. Rick Bowering felt that some type of degree-day method would be most representative, others agreed.

Rick Bowering indicated concern with modeling a continued 20-year wet-cycle, he cautioned that it is his understanding that Leon Osborne's climate prediction may not be widely supported by others in the field. He would be more comfortable if the modeling were based upon a more representative forecast.

The following potential revised schedule was proposed and agreed to.

> Develop a test case using a revised modeling methodology and email for review by CoE, USGS and others, by 3-5-01.
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> Teleconference call summarizing review, 1:00 CST 3-08-01
>
> Finish calibration of other sub-basins, 3-20-01
>
> Complete future scenario runs and forward data to CoE, 3-30-01
>
> Submit draft report, morning of 4-09-01.
>
> Review meeting, 4-12-01

Skip Vecchia stated the above schedule would work, and that it would take him about one-week to provide his results from the data provided to him.

Bruce suggested comparing the numbers found in this study with those for the St. Joe-Calio sub-basin done by the USBR. Bill Pearson indicated a concern with the subjectivity of the USBR analysis. He stated that there were problems with the photo interpretation and timing of field verification (too late to get temporary seasonal wetlands).

Bill asked if Roger Hollevoet's idea of using coulees for storage was being considered as an alternative, he was told that it was not under consideration at this time.

Bruce asked a question regarding the contributing area per depression; Selena explained that some had more than enough contributing area to fill while others did not. It is expected that, on average, the numbers will balance out within reason.

Selena briefly described the four-quadrant analysis of the relationship between drainage area and depressional volume undertaken earlier in the study.

A discussion was held regarding the issue of any data in the project report being taken out of context. It was suggested that a summary statement could be included as part of the report. This statement would summarize the intent of the report and could be co-signed by the various agencies involved. Agency agreement would be worded in a manner such that it did not necessarily constitute their agreement with the data within, or results of, the report. Bob Engelstad suggested putting a disclaimer at the bottom of each table.

Skip pointed out that the surface area of Devils Lake increases faster in the West than the East as a function of volume. Bruce added that restoring deep ponds could actually decrease evaporation, as they may be deeper than the average depth of newly inundated areas.

Skip stated that he used a combination of pan evaporation from the 1970's at Devils Lake and the Mandan and Dickinson data with an adjustment factor.

Skip indicated that, with the exception of 1988, the soil profile has been getting wetter since about 1980.
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Conference call summary: Devils Lake Upper Basin Storage Phase 2 Study Conference call, 1:00 CST March 8, 2001, St. Paul, Minnesota.

Participants: Pat Foley (CoE), Bob Engelstad (CoE), Dan Reinartz (CoE), David Williams (WEST Consultants), Brian Doeing (WEST Consultants), Selena Forman (WEST Consultants), Leo Kreymborg (WEST Consultants), Rick Voigt (Polaris Group), Gregg Wiche (USGS), Skip Vecchia (USGS), Kevin Vining (USGS), Dale Frink (NDSWC), Bruce Engelhardt (NDSWC), David Goldman (HEC), James Doan (HEC)

Discussion:

Bob Engelstad began by introducing all parties participating in the call and by outlining the purpose for the call. Brian Doeing followed with a summary of all that transpired since the February 21, 2001, second review meeting and a description of how depressions were classified.

Brian referred to the depression classification flow chart presented at the first review meeting that was used by WEST Consultants, Inc., and Polaris Group, Inc. It begins by asking whether the depression is a lake shown on the USGS quadrangle map.

If is not a lake, does it correspond to a feature characteristic of water retention visible on the aerial photos? If it does, the next step is to see if there is a visible drainage path connected to the depression.

If there is a visible drainage path, judgment is used to determine if drainage is into or out of the depression. Those judged to be draining into the depression are called “intact” and those judged to be draining away from the depression are called “drained.”

If there is no visible drainage path connected to the depression and it is not visibly farmed, it is called “intact.” If there is no visible drainage path connected to the depression but furrows from farming are visible in the depression, it is classified as “drained.” It was not attempted to categorize drained depressions into completely drained or partially drained.

Following that second review meeting, two separate tracks were undertaken with the goal of producing at least one functional program capable of modeling the entire basin.

1) Selena Forman continued to develop the HMS-model ultimately creating a five-box, two-reservoir model that still didn’t meet all desired objectives.

2) Leo Kreymborg, independently developed an in-house model using Access, the GIS information, and standard hydrologic routing techniques that appears to better represent the general processes in the basin. The model was calibrated for the Upper Mauvais coulee sub-basin with realistic values for the calibration parameters.

WEST is recommending that this second model be used for analysis of the remainder of the basin.

Dale Frink questioned the total number of drained depressions; he indicated that many of the farmed through depressions that were classified as drained as part of this study may be Type 1 wetlands that seasonally hold water for a short period of time but are typically farmed. He said that there is nothing to restore on Type 1 wetlands and suggested that depressions not be called "drained" if there is no drain visible. He suggested the term "drained" be changed to "possibly drained."

Representatives from WEST explained that they could not report how many of the depressions classified as "drained" were in the group of farmed depressions with no visible drains. They were classified as drained because it was assumed that since the depression was disturbed for farming, it may no longer have the storage capacity that it had before it was disturbed. Since the impact that farming had on the depression could not be determined in this process, and no distinction could be made between drained and partially drained, it was classified as "drained." It was generally agreed that there could be some error in calling these depressions drained because of the limitations of the classification procedure and the lack of field verification.

A lengthy discussion was held about excluding from the restoration alternatives analysis depressions that might not really be drained or that would be uneconomical or otherwise infeasible to restore. Since this could not be explicitly done, it was agreed by those in attendance that restoring only those drained depressions with an average depth of greater than 1.0 to 1.5 feet may be reasonable, depending on what percentage of the total estimated volume this represented. It was discussed that:

1) The Type 1 wetlands described by Dale Frink most likely are shallow and have average depths less than 1.0 to 1.5 feet.

2) James Landenberger (NDSWC) stated at the first review meeting in St. Paul in January 2001, that the ASAP program normally doesn't consider it feasible to restore depressions with average depths less than 1.0 to 1.5 feet.

3) The resolution of the DEMs and the inability to field verify the ponds makes the shallow depressions subject to the most uncertainty. [For the reader: As a result of the final quality assurance check on depression classification, WEST reports the following information which has become available after the telephone conference call.]

For the entire Devils Lake upper basin (excluding contributing area to Stump Lake) the classification of "drained" or "possibly drained" depressions totals 52,200 depressions, with a maximum surface area of 92,400 acres and a maximum volume of 132,700 acre-feet (this represents the maximum depression area and volume at the point of overflow).

Those "drained" or "possibly drained" depressions with an average depth of less than 1.0 feet total 47,900 in number with a maximum surface area of 37,900 acres and a maximum volume of 23,800 acre-feet. Those "drained" or "possibly drained" depressions with an average depth of less than 0.5 feet total 38,700 in number with a maximum surface area of 12,700 acres and a maximum volume of 4,900 acre-feet.

Therefore, excluding all the "drained" or "possibly drained" depressions with an average depth less than 0.5 feet from the alternatives analysis would result in the following restoration set - 13,500 depressions in number with a maximum surface area and volume of 79,700 acres and 127,800 acre feet, respectively.

For comparison, the NDSWC identified 21,000 drained wetlands covering 37,000 acres in the Devils Lake watershed. A letter from Brett Hovde (NDSWC) to Robert Whiting (Army Corps, St. Paul District) dated July 14, 1998, explains that the most accurate number in the State's study is the number of drains. The surface acreage reported has been described to David Sprynczynatyk, State Engineer, in a March 18, 1999, letter from NDSWC staff engineers Grafsgaard and Gerhinger, as "a quick estimation" based on the area indicated on the NRCS wetland maps or using what appeared to be the edges of a non-identified drained wetland.

Using 0.5 feet average depth as the cutoff results in a number of depressions in the restoration set that is lower than the State's estimate (13,500 vs. 21,000) but this is probably due in most part because the DEM combined a large number of individual drained depressions into a smaller number of larger depressions. Also it is possible that some of the drains identified by the State are less than 0.5 feet average depth. The surface area for this same restoration set is larger than in the State's drain study (79,700 acres vs. 37,000 acres) most likely because WEST is reporting the surface acreage to the maximum depression capacity. In our opinion, the area of the maximum depression storage being twice the area of the visible wetland boundary is not unreasonable. It is important to note that the hydrologic model developed by WEST only allows depressions to capture what the precipitation event delivers to the

depression and the depressions that are off the main flow path do not receive contributions from other depressions upstream.

Skip Vecchia asked what varying model parameters by sub-basin meant. Selena responded that it might be necessary to vary infiltration between sub-basins. Gregg Wiche recommended not tweaking much in the absence of additional data to support the changes. He felt the model would be more defensible and reasonably predictive by not varying infiltration.

Pat Foley and Dan Reinartz asked and Selena confirmed that in our model setup no infiltration occurs from depressions nor does any water percolate to groundwater from them. Based on our discussions with the USGS, infiltration and percolation could be assumed to be negligible in the depressions.

It was agreed that the analysis should proceed using the model developed in house.

Meeting Minutes: Devils Lake Upper Basin Storage Phase 2 Study Draft Report Review Meeting, St. Paul District U.S. Army Corps of Engineers Office, 9:00 a.m., April 12, 2001, St. Paul, Minnesota.

Present: Chuck Spitzack (CoE), Bob Engelstad (CoE), Bob Anfang (CoE), Dave Loss (CoE), Jeff McGraft (CoE), Dan Reinartz (CoE), Dennis Holme (CoE), David Williams (WEST Consultants), Selena Forman (WEST Consultants), Rick Voigt (Polaris Group), Skip Vecchia (USGS), Bruce Engelhardt (NDSWC), Bill Pearson (USFWS), Alan Sapa (USFWS), Rick Bowering (Manitoba Conservation Department), Jim Arndt (Peterson Environmental Consultants Inc.)

Discussion:

Bob Engelstad began by acknowledging that all participants were familiar with the project and briefly outlined the scope and agenda for the meeting. David Williams and Selena Forman of WEST Consultants presented a PowerPoint presentation summarizing the Draft Report of the Devils Lake Upper Basin Storage Evaluation dated April 6, 2001. The presentation summarized the following tasks completed during the study: data collection, GIS processing, depression delineation and classification, hydrologic modeling approach, hydrologic model calibration and upper basin storage alternative analysis. Questions were generally addressed as they arose during the presentation.

During the final QA review, it was found that some of the classifications for the non-DEM depressions were inconsistent with the flowchart. These depressions were reclassified (based upon the flowchart) and the preliminary results presented at the 2nd Review Meeting were adjusted accordingly. Selena explained the classification process and that the WEST/Polaris Group team is confident in the numbers obtained using that method of classification. Selena cautioned that due to the timing of the study no field verification was possible. She also pointed that should one choose a different methodology, a different number of intact and drained depressions is possible.

Originally, the hydrologic model of the Devils Lake basin was going to be developed using the HEC Hydrologic Modeling System (HEC-HMS). However, it was determined that the HEC-HMS model could not reasonably be configured within the project time constrained to adequately model the hydrologic function of the depressions. Selena presented the steps that would be required to set-up an HEC-HMS model and discussed further discussed the limitations.

A custom hydrologic model, the Pothole-River Networked Watershed Model (PRINET), was developed to simulate depression storage, soil storage, and runoff in the Devils Lake basin.

The model was written inside a Microsoft Access database that used the GIS depression, subbasin, and river network data. Most of the hydrologic calculations use the same algorithms as HEC-HMS. The average subbasin size modeled in the Devils Lake basin was 0.1 square miles. There was an average of 13 depressions per subbasin. Selena discussed the limitations and advantages to the approach selected.

Following the presentation, the various agencies asked questions they had developed during the review of the report. Alan Sapa of the USFWS asked why the average annual incremental impact of depressional storage in the upper basin was only equivalent to 3 to 4 inches of evaporation from a depression. Two primary reasons this may be the cause for this. First, the average drainage area per depression is about 14 acres while the average surface area of the depression is about 6 acres. This leads to a drainage to depressional area ratio of about 2.5, which when combined with the average runoff of 1.2 inches provides only about 3 inches of runoff being transferred to storage. Further the area of the depression provided is the maximum value up to the spill level. Unless the pond is totally full, the surface area available for evaporation is less than the maximum and is continually reduced as depression storage is depleted.

Rick Bowering of the Manitoba Conservation Department suggested the report text be modified to indicate that a correlation between soil type and depressions may exist but that the data available at this time did not support a correlation.

Bruce Engelhardt stated that the NDSWC would have difficulty accepting the stating of over 50,000 drained depressions in the executive summary. Following a lengthy discussion, it was agreed that the qualifying word “probably” be inserted prior to the words “intact” and “drained” and the appropriate qualifiers and definitions be added as footnotes to the associated tables in the report.